



SACRAMENTO METROPOLITAN FIRE PROTECTION DISTRICT

Equipment Division

Hose Specification

1 ½", 1 ¾", 2 ½"

All Synthetic, Double Jacket, EPDM Rubber-Lined

SCOPE OF WORK/SPECIFICATIONS:

Quality: The fire hose to be supplied under this specification shall be a premium quality, double jacket, municipal fire hose. All materials used in the fabrication of the hose shall be of the best quality, commercially available.

Service Life: The fire hose furnished under the terms of this proposal has a potential service life of 10 years, barring mistreatment or accidental damage that would render the hose unfit for service. Upon delivery, the fire hose shall be in first-class condition free from defects in workmanship and materials. The supplier shall provide replacement of any such hose which may be defective, without any charge whatsoever to the Sacramento Metropolitan Fire.

TECHNICAL INFORMATION

Quality Assurance: The manufacturer must be committed to a Total Quality Management program designed to meet **ISO International Standard 9002 (1987 E.)**. Quality Management procedures shall regulate twisting of yarns, weaving of jackets, extruding of linings, coating of outer jacket, vulcanizing and coupling of hose, and physical and laboratory testing of all raw materials and finished hose. The manufacturer shall maintain current calibrations on all test apparatus traceable to the National Institute of Standards and Technology (NIST). No exceptions are to be allowed. All hose shall be UL tested and listed. All listings shall be available upon request to the bidder.

NFPA Standard: The hose must meet all the requirements of **NFPA 1961, Standard on Fire Hose (Latest Edition)**.

Jackets: The jackets shall be evenly and firmly woven, free from unsightly defects, dirt, knots, lumps, and irregularities of twist that might affect the serviceability of the finished product.

Each jacket shall be seamless and shall have polyester filler yarns woven around the hose throughout its length, with the warp ends interwoven with warp yarn and covering the filler yarn.

Warp ends of both the inner and outer jackets shall be nylon 6/6 entangled filament yarn, structured to allow total saturation with an approved coating. The use of polyester or staple yarns in the warp is not allowed. The yarn manufacturer's published melt point shall not be less than 489° F for the nylon 6/6 yarn used to make the hose.

Filler yarns of both the inner and outer jackets shall be high-tenacity filament polyester developed, designed, and processed for fire hose jacket filler yarns. These filament polyester yarns shall be free from defects that are unsightly or may affect the serviceability of the finished hose. The entangled nylon warp ends must completely cover and protect the filament polyester filler yarns.

The outside and inside jacket fit is critical to the finished hose. After the initial proof test pressure, there shall be no excess outer jacket bagginess. The jackets must fit snugly inside one another under zero pressure or under proof and service test pressures.

Hose jacket to be stenciled with Metro Fire Sacramento and a numbering system as provided by Sacramento Metropolitan Fire in indelible ink on both ends of the hose. The letters will be at least 1 ½" in height at a point not less than 4' from each end. All other letter requirements per NFPA 1961 (latest edition) shall also be included. Metropolitan Fire Sacramento will specify color of the hose upon issuance of the purchase order.

Impregnation: The outside jacket shall be completely impregnated by a mechanical process, which provides for a total saturation of an approved coating. The coating shall have a built in heat and flame retardant, it shall provide superior abrasion resistance and superb resistance to petrochemicals. Water pick-up should be virtually eliminated. All vendors shall provide individual coating specifications.

Lining: The rubber lining shall be a single ply extrusion of EPDM polymer, which naturally resists ozone and oxidation. Styrene butadiene rubber (SBR), which is not a natural resistor, is Not Acceptable. Thermoplastic liners such as polyurethane are also Not Acceptable. The surface must be smooth and free from corrugations. The lining thickness shall be tightly controlled to reduce weight and kink radius.

Thickness: 1½", 1¾, & 2½" 0.034 to 0.046"

Couplings: The couplings shall be lightweight rocker lug, and comply with NFPA 1963 Standard. One male and one female with NST threads are to be properly installed on each length of hose by the hose manufacturer. The couplings shall be hard coated, and shall have tapered ends on the coupling bowls. All couplings shall be of one piece extrusion construction and manufactured in the United States. Bidder shall provide upon awarding of the bid a certificate of "Manufacture from the Coupling" manufacturer.

Tensile Strength: 1600-psi minimum.

Elongation: 400% minimum (1" to 6")

Ozone Resistance: Lining specimens shall be subjected to ASTM D 1149 (latest revision) "Standard Test Method for Rubber Deterioration — Surface Ozone Cracking in a Chamber". Specimens shall be prepared in accordance with ASTM D 518-86, "Standard Test Method for Rubber Deterioration — Surface Cracking", Procedure C, and shall be elongated 15%. Ozone concentration shall be 100+/- 5 parts per hundred million by volume. Temperature shall be 40.0° +/- 1.0° C (104° F). Time shall be 100 hours.

There shall be no appearance of cracking or crazing when viewed under a 7-power magnifying glass at any time during or at the end of the 100-hour exposure.

Accelerated Aging: Lining specimens shall be subjected to ASTM D573-88, "Standard Test Method for Rubber — Deterioration in an Air Oven". Specimens shall be exposed to 70° +/- 1° C temperature for duration of 166 +/- 2 hours and shall be allowed to rest for 24 +/- 1 hours before testing. The tensile strength and ultimate elongation of the rubber lining after aging shall not be less than 75 percent of the original tensile and elongation.

Adhesion: The adhesive must be of uniform thickness around the circumference of the lining. Calendered adhesive with an overlap is Not Acceptable. The adhesion shall be such that the rate of separation of a 1½" strip of lining, transversely cut, shall not be greater than 1" per minute under a weight of 18 lbs. - - No Exceptions. Thickness of liner and adhesive shall not exceed 0.052" for 1½" through 2½" hose.

Low Temperature Flexibility: the hose shall be capable of performing in extreme cold temperature conditions. A 3-foot section of hose shall be exposed to a temperature of -54° +/- 2° C (-65° +/- 3° F) for a period of 24 hours. At the end of the exposure period, and while maintained at the -55°C exposure temperature, the hose shall be rapidly bent 180° double on itself, first one way and then the other. There shall be no cracking or breaking of the jacket or liner. Leakage shall be cause for rejection.

Service Test:

Metro Fire requires that all hose shall be received with the annual service test completed by the manufacturer. All records of the annual service test shall be provided to Metro Fire upon delivery of the hose. Metro Fire requires that an inspection trip to the factory will be provided during the annual service-testing phase at no cost to Metro Fire. All hose received by Metro Fire shall be available for immediate service without further testing.

Hydrostatic Test:

- (A) The hose shall be coupled and tested at the point of manufacture. Hydrostatic tests shall be conducted on hose equipped with the couplings to be delivered in accordance with NFPA 1961.
- (B) Each length of hose is to be subjected to a hydrostatic proof test pressure of 800 psig for at least 15 seconds and not more than 1 minute. Higher test pressures, which may weaken the hose, are expressly forbidden.

(C) **Twist**: The hose shall not twist more than 4-1/4 turns per 50 ft for the 1½", 1¾" sizes, and not more than 1¾" per 50 ft for the 2½" size under a pressure of 800 psig. No final twist in a direction to loosen the couplings shall be permitted.

(D) **Warp**: The hose shall not warp more than 20" from a straight line drawn from center to center of the fittings at the ends of the hose, and the hose shall not rise from the table.

(E) **Expansion**: The expansion in circumference of the hose between 10 and 800 psig shall not exceed 8%.

(F) **Elongation**: The elongation between 10 and 800 psig shall not exceed 8% for the 1½, 1¾" and 2½" sizes.

Burst Test: A 3-foot sample of hose chosen at random shall withstand, without failure, a hydrostatic pressure of 1200 psig while lying straight or curved on a 27" radius. Retention of the coupling to the hose shall equal or exceed the burst pressure.

Kink Test: A full length shall withstand, while kinked, without failure, a hydrostatic pressure of 600 psig.

Abrasion Test: Hose shall withstand 10,000 cycles on the F.M. abrasion test as specified by Factory Mutual.

Diameter: The hose shall have an internal diameter of not less than the trade size of the hose, except that internal diameter of the 2½" hose shall not be less than 2-9/16".

Weight Chart:

Hose Size		Proof Test Pres. (psig)	Service Test Pres. (psig)	Burst Test Pres. (psig)	Kink Test Pres. (psig)	Cplg. Bowl Size (in.)	Weight per 50' Uncpld. (lbs)	Coil dia. Per 50' (in.)	Flat Width
1½"		800	400	1200	600	1-15/16	15	18	2-11/16
1¾"		800	400	1200	600	2-1/8	17	18	3-1/8
2½"		800	400	1200	600	3	28	20	4-1/4

Method of Testing:

(A) All measurements and tests necessary to determine compliance of the fire hose with the specified requirements shall be made in accordance with ASTM D 380-87, "Standard Test Methods for Rubber Hose", except as otherwise specified.

(B) All tests shall be conducted at the point of manufacture, or at a laboratory equipped for such testing. All tests shall be performed as specified in NFPA 1961 (Latest edition). Hydrostatic tests shall be conducted under controlled conditions employing equipment capable of supplying a uniform pressure.

Shipping Costs. All orders over \$5,000 shall be shipped without cost to the District.